

THE 1375 MA “KIBARAN EVENT” IN CENTRAL AFRICA: PROMINENT EMPLACEMENT OF BIMODAL MAGMATISM UNDER EXTENSIONAL REGIME

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The Kibaran belt has often been portrayed as a 1500 km long continuous orogenic belt, trending NE from Katanga (Democratic Republic of Congo, DRC) to SW Uganda. The “belt”, however, consists of two segments, separated in the DRC by a Palaeoproterozoic (Rusizian) basement rise in continuity with the NW-SE trending Ubendian shear belt further south in Tanzania. Here, we redefine the two segments of the Kibaran belt on either side of the rise: 1) to the NE, the “Karagwe-Ankole belt” (KAB), spanning Rwanda and Burundi, SW Uganda and NW Tanzania as well as the Kivu-Maniema region of the DRC and 2) to the SW, the “Kibara belt” (KIB) including the Kibara Mountains type locality in Katanga, DRC. Previous attempts at reconstructing the history and geodynamic evolution of the KAB (and of the KIB) relied on a few bulk zircon ages and lots of Rb-Sr or K-Ar data, often on two-mica granitoid rocks. These studies, based on various criteria adopted by various authors at various times in various countries, have led to confusing and mutually excluding terminologies, and to the concept of a protracted Kibaran orogeny, with distinct melting batches and successive intrusive phases. We document new SHRIMP U-Pb zircon magmatic ages, 40Ar/39Ar ages and laser ablation zircon Hf data, all of them obtained from previously already isotopically “dated” rock specimens. Results are spectacular: within the KAB, a prominent coeval bimodal magmatism is emplaced at 1375 Ma, marked by: 1) the 350 km long Kabanga-Musongati (KM) alignment of mafic and ultramafic, Bushveld-type, layered complexes and 2) voluminous S-type granitoid rocks with accompanying subordinate mafic intrusive rocks. The 1375 Ma magmatic event, the occurrence in SW Rwanda of Palaeoproterozoic basement and the lack of remnant oceanic crust, ophiolites and juvenile volcanic arc type magmatic rocks in the KAB, are all indicative of a regional-scale intracratonic emplacement of the coeval bimodal magmatism (including the KM alignment) under extensional regime. Both aeromagnetism and gravimetry suggest a thermal anomaly in the mantle to be at the origin of the 1375 Ma bimodal magmatism of the KAB. This zone of anomaly is located along a crustal-scale lithospheric weakness zone, i.e. the rheological boundary between the Archaean Tanzania craton (with specific indentor palaeomorphology) to the east, and the adjacent Eburnean-aged (2.1 Ga) mobile belt to the west. The mantle-derived magmas initiated concomitantly and under extension, large-scale crustal melting preferentially of the Palaeoproterozoic basement, the latter characterized by the absence of a thick lithospheric profile in contrast to the nearby Archaean craton. Such petrogenetic processes have intra-plate characteristics and are thus not associated with normal plate boundary processes nor with their typical magmatism. On the contrary, they may include rift-related packages, characteristically associated to unsuccessful continental break-up. In Katanga, the KIB has also been the subject of recent detailed field and laboratory work. Emplacement of coeval S-type granitoid rocks (SHRIMP-ages) and associated, subordinate, mafic-intermediate igneous rocks occurred at 1.39-1.38 Ga (Kokonyangi et al., 2005). In contrast to the KAB, no mafic and ultramafic layered complexes were recognised. It is worth noting that the independent, bimodal and coeval Kunene Anorthosite Complex was emplaced in the same time-span at the margin of the Congo craton in southern Angola at a distance of ca. 2500 km of the KAB. Renewed intracratonic activity in the region is evidenced at 795 Ma, leading to the emplacement of the adjacent Kabuye-Gagwe CFBs. For decades the term “Kibaran” has been used to name the orogenic “cycle” and/or orogeny occurring in (central) Africa in “late” Mesoproterozoic times (1.4-1.0 Ga), which was considered to have a protracted character (Tack et al., this meeting). Here, we propose to restrict the term “Kibaran” only to the prominent tectono-magmatic “event”, giving rise to the 1375 Ma emplacement under extensional regime of coeval bimodal magmatism. This “Kibaran event” pre-dates compressional deformation, reflecting far-field effects of global orogenic events, external to the craton and possibly related to Rodinia and Gondwana amalgamation.